

Application no. 10/751,266

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Please amend Claims 79, 107, 129, and 145, cancel duplicate Claims 126, and add Claims 146-150.

CLAIMS

1. (Withdrawn) A system for deploying and retracting a filter during a procedure, the system comprising:

(a) a filter device adapted to capture material within a fluid, said filter device comprising:

(i) a guide member adapted to act as an exchange guidewire;

(ii) a filter connected to said guide member, said filter being adapted to capture the material within the fluid;

(iii) a restraining member coupled to said guide member and adapted to prevent said filter from being deployed;

(iv) an actuating assembly cooperating with said restraining member, said actuating assembly being configured to deploy said filter and maintain said filter in a selected position upon activation of said actuating assembly; and

(b) a capture catheter selectively coupled to said filter device, said capture catheter being adapted to at least partially surround said filter when material has been captured by said filter following deploying said filter.

2. (Withdrawn) A system as recited in claim 1, wherein said guide member further comprises a distal end and a proximal end, said distal end comprising a plurality of struts.

3. (Withdrawn) A system as recited in claim 1, further comprising a strut assembly coupled to a distal end of said guide member, said strut assembly comprising a plurality of struts.

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4. (Withdrawn) A system as recited in claim 1, wherein said restraining member comprises at least one of a sleeve and a securing member.

5. (Withdrawn) A system as recited in claim 1, wherein said filter device comprises a plurality of struts, wherein said restraining member comprises at least a part of said plurality of struts and a securing member.

6. (Withdrawn) A system as recited in claim 1, wherein said restraining member comprises at least part of said filter, wherein said at least part of said filter substantially surrounds a distal end of said guide member.

7. (Withdrawn) A system as recited in claim 1, wherein said actuating assembly comprises an actuating member coupled to at least one of said filter and said restraining member.

8. (Withdrawn) A system as recited in claim 1, wherein said actuating assembly comprises:

(a) an actuating member disposed between said restraining member and said guide member; and

(b) an actuating mechanism coupled to said restraining member and configured to move said restraining member in a proximal direction.

9. (Withdrawn) A system as recited in claim 1, wherein said capture catheter receives at least a portion of said filter device.

10. (Withdrawn) A system as recited in claim 1, wherein said capture catheter is an over-the-wire capture catheter.

11. (Withdrawn) A system as recited in claim 1, wherein said capture catheter is a rapid exchange capture catheter.

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12. (Withdrawn) A system as recited in claim 1, further comprising at least one radiopaque marker coupled to at least one of said filter device and said capture catheter.

13. (Withdrawn) A system for deploying and retracting a filter device for use during a procedure, the filter system comprising:

(a) a filter device adapted to capture material within a fluid, said filter device comprising:

(i) a guide member adapted to act as an exchange guidewire;

(ii) a filter assembly coupled to said guide member, said filter assembly comprising a filter adapted to capture material within the fluid and a plurality of struts coupled to said filter, said plurality of struts being adapted to extend outwardly to open said filter;

(iii) a restraining member coupled to at least one of said guide member and said filter assembly, said restraining member being adapted to prevent said plurality of struts extending outwardly to deploy said filter;

(iv) an actuating assembly cooperating with said restraining member, said actuating assembly being configured to release said restraining member to enable said plurality of struts to extend outwardly; and

(b) a capture catheter coupled to said filter device, said capture catheter being adapted to at least partially surround said filter when material has been captured by said filter following deploying said filter.

14. (Withdrawn) A system as recited in claim 13, wherein said restraining member comprises a sleeve adapted to slideably cooperate with said guide member.

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15. (Withdrawn) A system as recited in claim 14, wherein said actuating assembly comprises an actuating member coupled to said sleeve and an actuating element coupled to said actuating member, wherein moving said actuating element moves said actuating member to enable said plurality of struts to extend outwardly.

16. (Withdrawn) A system as recited in claim 13, wherein said restraining member comprises a sleeve surrounding at least a portion of said filter device and a securing member cooperating with said sleeve, wherein the cooperation between said sleeve and said securing member prevents said plurality of struts extending outwardly to deploy said filter.

17. (Withdrawn) A system as recited in claim 13, wherein said actuating assembly further comprises an actuating member coupled to said restraining member and an actuating element coupled to said actuating member.

18. (Withdrawn) A system as recited in claim 13, wherein said plurality of struts are biased to open said filter.

19. (Withdrawn) A system as recited in claim 13, wherein at least one of said plurality of struts comprises a coil disposed thereon.

20. (Withdrawn) A system as recited in claim 13, wherein said filter assembly further comprises an aperture at a proximal end of said plurality of struts, said aperture being adapted to receive an atraumatic tip.

21. (Withdrawn) A system as recited in claim 13, wherein said capture catheter comprises a proximal end and a distal end, said proximal end being configured to couple to said actuating assembly and said distal end being configured to force said plurality of struts to close said filter as said distal end is advanced along said guide member.

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22. (Withdrawn) A system as recited in claim 21, wherein said capture catheter comprises a lumen extending from said proximal end to said distal end.

23. (Withdrawn) A system as recited in claim 21, wherein said capture catheter comprises a lumen extending from a distal end toward said proximal end, a proximal end of said lumen being distal to said proximal end of said capture catheter.

24. (Withdrawn) A system as recited in claim 21, wherein said capture catheter further comprises a positioning member adapted to enable said capture catheter to be positioned during a procedure.

25. (Withdrawn) A system as recited in claim 21, wherein said capture catheter further comprises:

- (a) a lumen extending from said distal end toward said proximal end; and
- (b) an output aperture communicating with said lumen, said output aperture being disposed intermediate of said proximal end and said distal end.

26. (Withdrawn) A system as recited in claim 13, wherein at least one of said filter device and said capture catheter comprises means for radiopacity.

27. (Withdrawn) A system as recited in claim 26, wherein said means for radiopacity comprises at least one radiopaque marker.

28. (Withdrawn) A system as recited in claim 26, wherein said means for radiopacity comprises at least one radiopaque coating applied to at least one part of said filter device and said capture catheter.

29.-36. (Canceled)

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37. (Withdrawn) A filter device comprising:

- (a) a guide member comprising a distal end, a proximal end, and a lumen extending from the distal end to the proximal end;
- (b) a plurality of struts coupled to said guide member, at least one of said plurality of struts being biased to extend outwardly;
- (c) a filter coupled to at least two of said plurality of struts, said filter being adapted to filter material from a blood stream; and
- (d) means for preventing said plurality of struts extending outwardly until said filter is to be deployed into a blood vessel.

38. (Withdrawn) A filter device as recited in claim 37, wherein each strut of said plurality of struts is adapted to extend outwardly away from a longitudinal axis of said lumen.

39. (Withdrawn) A filter device as recited in claim 37, wherein said means for filtering comprises a filter, said filter comprising a plurality of pores.

40. (Withdrawn) A filter device as recited in claim 37, wherein said guide member comprises an atraumatic tip.

41. (Withdrawn) A filter device as recited in claim 37, wherein at least one of said plurality of struts is biased toward a longitudinal axis of said lumen.

42. (Withdrawn) A filter device as recited in claim 37, wherein at least one of said plurality of struts comprises an atraumatic tip coil.

43. (Withdrawn) A filter device as recited in claim 37, further comprising at least one radiopaque marker.

44. (Withdrawn) A filter device as recited in claim 37, wherein a portion of said guide member is made radiopaque.

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45. (Withdrawn) A filter device comprising:

- (a) a guide member comprising a distal end, a proximal end, and a lumen extending from the distal end to the proximal end;
- (b) a strut assembly coupled to said distal end of said guide member, said strut assembly comprising a plurality of struts, at least one of said plurality of struts being biased to extend outwardly away from a longitudinal axis of said lumen of said guide member;
- (c) a filter coupled to at least one of said plurality of struts, said filter being adapted to filter material from fluid flowing in a fluid stream within which said filter is disposed; and
- (d) a restraining member surrounding at least one of said plurality of struts and said distal end of said guide member, said restraining member being adapted to prevent said plurality of struts extending outwardly and subsequently release said plurality of struts when said filter is to be deployed into the fluid stream.

46. (Withdrawn) A filter device as recited in claim 45, wherein said filter comprises a plurality of pores, at least two of said plurality of pores being differently configured one from another.

47. (Withdrawn) A filter device as recited in claim 45, wherein said filter comprises a plurality of pores, wherein each of said plurality of pores is sized in the range from about 60 microns to about 100 microns.

48. (Withdrawn) A filter device as recited in claim 45, wherein said restraining member is adapted to be moved in a proximal direction to enable said plurality of struts to extend outwardly.

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49. (Withdrawn) A filter device as recited in claim 48, further comprising an actuating member coupled to said restraining member and extending substantially to said proximal end of said guide member, said actuating member being adapted to move in the proximal direction to move said restraining member in the proximal direction.

50. (Withdrawn) A filter device as recited in claim 45, wherein said restraining member is attached to each of said plurality of struts, said restraining member comprising at least one preferential separation region.

51. (Withdrawn) A filter device as recited in claim 50, further comprising at least one actuating member cooperating with said at least one preferential separation region, said at least one actuating member adapted to cause said restraining member to preferentially separate at said at least one preferential separation region.

52. (Withdrawn) A filter device for percutaneous insertion into a blood vessel during a procedure, the filter device comprising:

- (a) a guide member comprising a distal end, a proximal end, and a lumen extending from said distal end to said proximal end, said guide member being configured to act as an exchange guidewire;
- (b) a filter assembly coupled to said guide member, said filter assembly comprising a filter adapted to filter material from a blood stream and a plurality of struts; and
- (c) means for preventing said plurality of struts from extending outwardly to allow said filter to deploy into the blood stream in the blood vessel.

53. (Withdrawn) A filter device as recited in claim 52, wherein each of said plurality of struts is biased to open said filter.

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54. (Withdrawn) A filter device as recited in claim 52, wherein said filter comprises an open proximal end and a closed distal end, said proximal end being adapted to conform to an inner surface of the blood vessel.

55. (Withdrawn) A filter device as recited in claim 52, wherein said filter opens in response to a force applied by the blood flowing through the blood vessel.

56. (Withdrawn) A filter device as recited in claim 52, wherein said filter is fabricated from a woven mesh material.

57. (Withdrawn) A filter device as recited in claim 52, wherein said filter comprises a material comprising a plurality of pores.

58. (Withdrawn) A filter device as recited in claim 57, wherein each of said plurality of pores is sized in the range from about 60 microns to about 100 microns.

59. (Withdrawn) A filter device as recited in claim 57, wherein a major axis and a minor axis of each of said plurality of pores is sized in the range from about 50 microns to about 200 microns.

60. (Withdrawn) A filter device as recited in claim 52, further comprising means for radiopacity coupled to at least one of said guide member, said filtering, said plurality of struts, and said means for preventing.

61. (Withdrawn) A filter device as recited in claim 60, wherein said means for radiopacity comprises at least one of (i) a plurality of markers fabricated from a radiopaque material (ii) a plurality of markers coated with a radiopaque material and (iii) a plurality of markers doped with a radiopaque material

62. (Withdrawn) A filter device as recited in claim 27, wherein said guide member comprises a flexible,atraumatic tip coupled to said filter assembly.

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63. (Withdrawn) A filter device as recited in claim 62, wherein said tip extends through said filter.

64. (Withdrawn) A filter device as recited in claim 52, wherein said filter assembly is integral with said guide member.

65. (Withdrawn) A filter device as recited in claim 52, wherein said filter assembly is a separate assembly coupled to said guide member.

66. (Withdrawn) A filter device comprising:

(a) a guide member comprising a distal end, a proximal end, and a lumen extending from the distal end to the proximal end;

(b) a filter assembly coupled to said guide member, said filter assembly comprising:

(i) a filter comprising a proximal end with an opening formed therein; and

(ii) a plurality of struts coupled to said proximal end of said filter, each of said plurality of struts being biased to open said opening; and

(c) an actuating assembly coupled to said guide member and said filter assembly, said actuating assembly comprising:

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- (i) a restraining member cooperating with said plurality of struts, said restraining member applying a restraining force to the plurality of struts to prevent the plurality of struts from extending outwardly;
- (ii) an actuating member coupled to said restraining member and extending toward said proximal end of said guide member; and
- (iii) an actuating element coupled to a proximal end of said actuating member, said actuating element being adapted to move in a proximal direction to release the restraining force to enable said plurality of struts to extend outwardly.

67. (Withdrawn) The filter device as recited in claim 66, wherein said actuating member is disposed in said lumen of said guide member.

68. (Withdrawn) The filter device as recited in claim 66, wherein said proximal end of said filter, when deployed, is constrained against the vessel wall.

69. (Withdrawn) The filter device as recited in claim 66, wherein said guide member further comprises at least one radiopaque marker.

70. (Withdrawn) The filter device as recited in claim 66, wherein at least one of said plurality of struts is biased to extend inwardly to a center of said lumen.

71. (Withdrawn) The filter device as recited in claim 66, wherein disposed upon a distal end of the at least one of said plurality of struts is a coiled tip.

72. (Withdrawn) The filter device as recited in claim 71, wherein said coiled tip extends through said filter.

73. (Withdrawn) The filter device as recited in claim 71, wherein said coiled tip is coupled to said filter.

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74. (Withdrawn) The filter device as recited in claim 71, wherein said coiled tip extends through an aperture in said filter.

75. (Withdrawn) The filter device as recited in claim 66, wherein said restraining member further comprises at least one preferential separation region.

76. (Withdrawn) The filter device as recited in claim 75, further comprising at least one actuating member cooperating with said at least one preferential separation region, said at least one actuating member adapted to cause said restraining member to preferentially separate at said at least one preferential separation region.

77. (Withdrawn) The filter device as recited in claim 66, where said plurality of struts are integrally coupled to said guide member.

78. (Withdrawn) The filter device as recited in claim 66, wherein said plurality of struts are separate members that are coupled to a distal end of said guide member.

79. (Currently Amended) A filter device for percutaneous insertion into a blood vessel during a procedure, the filter device comprising:

(a) a guide member comprising a distal end, a proximal end, and a lumen extending from the distal end to the proximal end;

(b) means for filtering material from a blood stream, said means being disposed within said lumen of said guide member and including an expansion frame supporting a filter mesh; and

(c) means for deploying said means for filtering from said lumen of said guide member into the blood stream in the blood vessel and retracting said means for filtering upon completing the procedure; and

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(d) an expandable member, coupled to the guide member, that is sized and configured to be inserted into a stenotic lumen of the blood vessel and to expand from an unexpanded dimension to an expanded dimension that is greater than the unexpanded dimension, such that the stenotic lumen of the blood vessel is less stenotic after expansion of the expandable member within the blood vessel than before the expansion.

80. (Original) A filter device as recited in claim 79, wherein said means for deploying comprises an actuating assembly.

81. (Original) A filter device as recited in claim 80, wherein said actuating assembly comprises an actuating member and an actuating element.

82. (Original) A filter device as recited in claim 81, wherein said actuating element is moveable by a human.

83. (Original) A filter device as recited in claim 81, wherein said actuating element is coupled to said guide member.

84. (Withdrawn) A filter device as recited in claim 81, wherein said actuating element comprises an open indicator, a closed indicator, and a retracted indicator.

85. (Withdrawn) A filter device as recited in claim 79, wherein said means for filtering comprises a filter.

86. (Withdrawn) A filter device as recited in claim 79, wherein said means for filtering comprises means for opening an end of said means for filtering.

87. (Withdrawn) A filter device as recited in claim 86, wherein said means for opening comprises a biased member.

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88. (Withdrawn) A filter device comprising:

(a) a guide member comprising a distal end, a proximal end, and a lumen extending from said distal end to said proximal end;

(b) an actuating assembly coupled to said guide member, said actuating assembly comprising:

(i) an actuating member disposed within said lumen of said guide member; and

(ii) an actuating mechanism coupled to said distal end of said guide member and to said actuating member; and

(c) a filter assembly disposed within said lumen and configured to be deployed by said actuating member, said filter assembly comprising:

(i) a filter comprising a proximal end with an opening formed therein; and

(ii) a plurality of struts coupled to said proximal end of said filter and said actuating member, at least one of said plurality of struts being biased to open said opening.

89. (Withdrawn) The filter device a recited in claim 88, wherein said actuating member is disposed in said lumen of said guide member.

90. (Withdrawn) The filter device a recited in claim 88, wherein said actuating member is partially disposed in said lumen of said guide member.

91. (Withdrawn) A filter device as recited in claim 88, wherein said filter assembly comprises means for opening said opening formed in the filter.

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92. (Withdrawn) A filter device as recited in claim 91, wherein said means for opening comprises a biased member.

93. (Withdrawn) A filter device as recited in claim 92, wherein said biased member is a flexible member.

94. (Withdrawn) A filter device as recited in claim 92, wherein said biased member is a spring member.

95. (Withdrawn) A filter device as recited in claim 91, wherein said means for opening comprises said actuating member.

96.-106. (Canceled)

107. (Currently Amended) A restraining mechanism configured to prevent a plurality of struts of a filter device from extending outwardly prior to deploying a filter of the filter device, the restraining mechanism comprising:

(a) a sleeve adapted to be disposed substantially at a distal end of the filter device, said sleeve being adapted to apply a restraining force to the plurality of struts of the filter device to prevent the plurality of struts from extending outwardly, ~~said sleeve supporting, on an outside surface of the sleeve, a balloon and defining a balloon inflation lumen connected in communication with the balloon; and~~

(b) a balloon in communication with a balloon inflation lumen of the sleeve, the balloon being sized and configured to be inserted into a stenotic lumen of a body vessel and to expand from an unexpanded dimension to an expanded dimension that is greater than the unexpanded dimension, such that the stenotic lumen of the body vessel is less stenotic after expansion of the expandable member within the body vessel than before the expansion; and

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(c)(b) at least one actuating member coupled to said sleeve, said at least one actuating member being adapted to release said restraining force of said sleeve and enable the plurality of struts of the filter device to extend outwardly.

108. (Original) A restraining mechanism as recited in claim 107, wherein said at least one actuating member is adapted to cause said sleeve to move in a proximal direction upon moving said at least one actuating member in said proximal direction.

109. (Withdrawn) A restraining mechanism as recited in claim 107, wherein said sleeve is coupled to at least two of said plurality of struts.

110. (Withdrawn) A restraining mechanism as recited in claim 107, wherein said sleeve comprises at least one preferential separation region.

111. (Withdrawn) A restraining mechanism as recited in claim 110, wherein said at least one actuating member cooperates with said at least one preferential separation region and is adapted to preferentially separate said sleeve at said at least one preferential separation region.

112. (Withdrawn) A restraining mechanism configured to prevent a plurality of struts of a filter device from extending outwardly prior to deploying a filter of the filter device, the restraining mechanism comprising:

(a) means for applying a restraining force to the plurality of struts of the filter device to prevent the plurality of struts from extending outwardly, said means for applying the restraining force being coupled to at least one of the plurality of struts; and

(b) at least one actuating member cooperating with said means for applying the restraining force, said at least one actuating member being adapted to release said restraining force of said means for applying said restraining force and enable the plurality of struts of the filter device to extend outwardly to deploy the filter.

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113. (Withdrawn) A restraining mechanism as recited in claim 112, wherein said means for applying the restraining force comprises a sleeve substantially surround the plurality of struts.

114. (Withdrawn) A restraining mechanism as recited in claim 113, wherein said sleeve is adapted to slide in a proximal direction upon moving said actuating member in the proximal direction.

115. (Withdrawn) A restraining mechanism as recited in claim 114, wherein said sleeve is a metallic sleeve.

116.-120. (Canceled)

121. (Previously Presented) The filter device of Claim 79, wherein the means for deploying and retracting the means for filtering is configured to collapse the expansion frame for retracting said means for filtering.

122. (Previously Presented) The filter device of Claim 79, wherein the expansion frame includes a plurality of struts supported by a guide wire extending at least partially through the lumen of the guide member.

123. (Previously Presented) The filter device of Claim 122, wherein the filter mesh includes a plurality of openings smaller than a plurality of spaces defined between the struts.

124. (Previously Presented) The filter device of Claim 123, wherein the filter mesh is draped over and attached to the plurality of struts.

125. (Previously Presented) The filter device of Claim 122, wherein the struts extend radially and longitudinally with respect to a longitudinal axis of the guide wire.

126. (Canceled)

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126. (Canceled)

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127. (Previously Presented) The filter device of Claim 107, wherein a stent, separate from the plurality of struts, is compressed around the balloon.

129. (Currently Amended) A filter device for insertion into a blood vessel downstream of an obstruction within the blood vessel, the filter device comprising:

an introducer sheath having a lumen extending at least through a distal end of the introducer sheath, said introducer sheath having a diameter small enough to extend down the blood vessel past the obstruction;

a guide wire including a longitudinal axis wherein the guide wire is configured to slidably extend through the lumen of the introducer sheath;

an expandable member, coupled to the introducer sheath, that is sized and configured to be inserted into the obstruction of the blood vessel and to expand from an unexpanded dimension to an expanded dimension that is greater than the unexpanded dimension, such that the blood vessel is less obstructed after expansion of the expandable member within the blood vessel than before the expansion;

an expansion frame supported on a distal portion of the guide wire and, in a collapsed condition, configured to fit within the lumen of the introducer sheath and, in an expanded condition, configured to expand away from the longitudinal axis of the guide wire when not within the lumen of the introducer sheath; and

a filter mesh supported by the expansion frame, configured to expand with the guide wire and capture embolic debris freed from the obstruction during surgical procedures on the blood vessel.

130. (Previously Presented) The filter device of Claim 129, wherein the expansion frame includes a plurality of struts having spaces defined therebetween.

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131. (Previously Presented) The filter device of Claim 130, wherein the filter mesh includes a plurality of openings smaller than the plurality of spaces defined between the struts.

132. (Previously Presented) The filter device of Claim 131, wherein the filter mesh is draped over and attached to the plurality of struts.

133. (Previously Presented) The filter device of Claim 132, wherein the struts extend radially and longitudinally with respect to a longitudinal axis of the guide wire.

134. (Previously Presented) The filter device of Claim 133, wherein the struts are circumferentially spaced apart from each other around the longitudinal axis of the guide wire.

135. (Previously Presented) The filter device of Claim 129, wherein the guide wire is configured to release the expansion frame from the lumen of the introducer sheath through relative sliding movement with the introducer sheath.

136. (Previously Presented) The filter device of Claim 129, wherein the guide wire has no lumen.

137. (Previously Presented) The filter device of Claim 136, wherein the introducer sheath supports a balloon.

138. (Previously Presented) The filter device of Claim 129, wherein the expansion frame, in its expanded condition, is configured to expand an external periphery of the filter mesh into circumscribing contact with an inner luminal wall of the blood vessel.

139. (Previously Presented) The filter device of Claim 138, wherein the mesh, when the expansion frame is in its expanded condition, spans an entire cross-section of the blood vessel so as to filter all blood passing therethrough.

140. (Previously Presented) The filter device of Claim 138, wherein the filter mesh material has an unbiased structure.

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141. (Previously Presented) The filter device of Claim 140, wherein the filter mesh is incapable of self-expansion into circumscribing contact with the inner luminal wall of the blood vessel independent of urging by the expansion frame

142. (Previously Presented) The filter device of Claim 129, wherein the filter mesh is incapable of self-expansion independent of urging by the expansion frame.

143. (Previously Presented) The filter device of Claim 130, wherein the filter mesh is configured to fit within the lumen of the introducer sheath when the expansion frame is in a collapsed condition.

144. (Previously Presented) The filter device of Claim 143, wherein a free end of the filter mesh and the struts are substantially parallel to the guide wire in the collapsed condition.

145. (Currently Amended) A percutaneous vascular filter system comprising:

a guidewire having proximal and distal ends, and

a filter comprising (a) a filter membrane having a distal portion and a proximal free end portion and (b) a filter membrane support structure extending from the flexible filter membrane distal portion to at least the flexible filter membrane proximal portion, the filter concentrically arranged around said guidewire, the distal end of the filter being attached to the guidewire adjacent its distal end and the proximal end of the filter being attached to the guidewire; and

an expandable member, coupled to the filter, that is sized and configured to be inserted into a stenotic lumen of a blood vessel and to expand from an unexpanded dimension to an expanded dimension that is greater than the unexpanded dimension, such that the stenotic lumen of the blood vessel is less stenotic after expansion of the expandable member within the blood vessel than before the expansion.

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146. (New) The filter device of Claim 79, wherein the expandable member comprises an angioplasty balloon.

147. (New) The filter device of Claim 129, wherein the expandable member comprises an angioplasty balloon.

148. (New) The filter device of Claim 145, wherein the expandable member comprises an angioplasty balloon.

149. (New) The filter device of Claim 125, wherein the struts are circumferentially spaced apart from each other around the longitudinal axis of the guide wire.

150. (New) The filter device of Claim 149, wherein the filter mesh is supported by the struts and has a plurality of openings smaller than a plurality of spaces defined between the struts.